NY

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Water-soluble fertilizers - Determination of organic matter content

水溶肥料 有机质含量的测定

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Water-soluble fertilizers - Determination of organic matter content

1 Scope

This Standard specifies the test method for the determination of organic matter content of water-soluble fertilizers.

This Standard applies to the determination of organic matter content in liquid or solid water-soluble fertilizers.

2 Normative references

The following documents are indispensable for the application of this document. For the dated references, only the editions with the dates indicated are applicable to this document. For the undated references, the latest edition (including all the amendments) are applicable to this document.

GB/T 8170 Rules of rounding off for numerical values and expression and judgement of limiting values

HG/T 2843 Chemical fertilizer products - Standard volumetric, standard, reagent and indicator solutions for chemical analysis

NY/T 887 Liquid fertilizers - Determination of density

3 Principle

USE a quantitative potassium dichromate-sulfuric acid solution to oxidize the organic carbon in the sample. The remaining potassium dichromate is titrated with a standard volumetric solution of ferrous sulfate. Based on the reagent blank, according to the volume of the oxidant consumed before and after the sample is oxidized, calculate the organic carbon content. The organic matter content is obtained by the conversion of the carbon coefficient.

4 Reagents and materials

The preparation of reagents, water, and solutions used in this Standard, when the specifications and preparation methods are not specified, shall comply with HG/T 2843.

V_2 - The volume of standard solution of ferrous sulfate consumed during titration, in milliliters (mL).

5 Apparatus

5.1 Usual laboratory apparatus.

5.2 Electric sand bath or other heating device with the same effect: The temperature (room temperature to 300°C) can be adjusted.

5.3 Ground Erlenmeyer flask: 200 mL.

5.4 Ground simple air condenser used with the ground Erlenmeyer flask: It is about 1 cm in diameter and about 20 cm in length.

6 Analytical procedures

6.1 Preparation of sample

After the solid sample has been divided for several times, take about 100 g; quickly grind it until it passes through a 0.50 mm aperture sieve (If the sample is wet, it may pass through a 1.00 mm sieve). MIX well and place in a clean, dry container. After shaking the liquid sample several times, quickly take about 100 mL and place it in a clean, dry container.

6.2 Preparation of sample solution

6.2.1 Solid sample: WEIGH 0.5 g~1 g (accurate to 0.0001 g) of sample in a 100 mL beaker; ADD a small amount of water; USE a glass rod to grind the solid to dissolve it; TRANSFER the solution to a 100 mL volumetric flask; USE water to dilute it and mix well.

6.2.2 Liquid sample: WEIGH 1 g~2 g (accurate to 0.0001 g) of sample and place it in a 100 mL volumetric flask; USE water to dilute it and mix well.

6.3 Oxidation of sample solution

Immediately after mixing, pipette 5.0 mL of sample solution (homogeneous emulsion) into a 200 mL ground Erlenmeyer flask; ADD 5.0 mL of potassium dichromate solution (4.6) and 10.0 mL of sulfuric acid (4.3).

Connect the Erlenmeyer flask to the simple air condenser; PLACE it on an electric sand bath that has been preheated to 200°C~230°C for heating. When the first drop of condensate drops from the lower end of the simple air condenser, the time is counted. Oxidize for 10 min±0.5 min. REMOVE the flask

and allow to cool. USE water to rinse the inner wall of the condenser; MAKE the volume of the solution in the Erlenmeyer flask about 120 mL.

Note: If an oil bath and a hole-shaped electric heating device are used for oxidation, it shall ensure that the heating glassware exposes at least 20 cm of the heat source and funnel is covered.

6.4 Titration

ADD 3~5 drops of phenanthroline indicator (4.5) to the Erlenmeyer flask; USE standard volumetric solution of ferrous sulfate (4.8) to titrate the remaining potassium dichromate. The color changing process of the solution reaches the end point through orange-yellow → blue-green → brown-red. If the volume consumed by the titration is less than 1/3 of the volume consumed by titrating the blank, it shall reduce the sample weighing quantity and re-determine.

6.5 Blank test

USE 5.0 mL of water instead of the sample solution. The other procedures are the same as the determination of the sample solution. Only when the titration absolute difference between two blank tests is ≤0.06 mL, the average can be taken and substituted into the calculation formula.

7 Expression of analysis results

Organic matter content (w) is expressed by its mass fraction (%) and calculated according to formula (2):

$$w_2 = \left[\frac{(V_1 - V_2)cD \times 0.003}{m} \times 100 - \frac{w_1}{12}\right] \times 1.724 \quad \cdots\cdots (2)$$

Where:

V_1 - The volume of standard volumetric solution of ferrous sulfate consumed in the determination of the blank, in milliliters (mL);

V_2 - The volume of standard volumetric solution of ferrous sulfate consumed in the determination of the sample, in milliliters (mL);

c - The concentration of standard volumetric solution of ferrous sulfate, in moles per liter (mol/L);

D - Dilution multiple of sample solution during determination;

0.003 - Mass of carbon in grams equivalent to 1.00 mL of standard volumetric solution of ferrous sulfate [$c(FeSO_4)$=1.000 mol/L];

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